A combination of the TDM with the SRQAM of the present invention has been described in the above. However, the SRQAM of the present invention can be combined also with any of the FDM, CDMA and frequency dispersal communications systems.

What is claimed is:

1. A signal transmission and reception apparatus for transmitting and receiving an n-level VSB signal, the apparatus comprising a transmitter and a receiver;

said transmitter comprising:

a compression means for compressing an input video signal to a digital video compression signal;

an error correction encoding means for adding an error correction code to the digital video compression signal to produce an error correction coded signal;

a modulation means for modulating the error correction coded signal to an n-level VSB modulation signal, said modulation means comprising a means for allocating code points along a uniaxial modulation coordinate system, and a filter means having a plurality of coefficients which are a series of impulse responses defined by plotting timebase responses to the VSB modulation signal along the in-phase axis and its orthogonal axis for filtering a series of said code points allocated along the uniaxial modulation coordinate system; and

a transmission means for transmitting the modulation signal, and

said receiver comprising:

a means for receiving a transmitted n-level VSB modulation signal;

a demodulation means for demodulating the received n-level VSB modulation signal into a digital reception signal;

an error correction means for error correcting the digital reception signal to obtain an error-corrected digital signal; and

an expanding means for expanding the error-corrected digital signal to obtain a video output signal.

2. A transmission and reception apparatus according to claim 1, wherein the error correction means comprises a trellis decoder.

3. A transmission and reception apparatus according to claim 2, wherein the trellis decoder is associated with a plurality of memories which each holds a number of selectable correct codes.

4. A transmission and reception apparatus according to claim 1, wherein the digital reception signal is divided into a high priority signal and a low priority signal, and wherein said error correction means comprises a high code gain first error correction means and a low code gain second error correction means, said first error correction means correcting the high priority signal.

5. A transmission and reception apparatus according to claim 4, wherein the high priority signal carries the address data for all data.

6. A transmission and reception apparatus according to claim 4, wherein the first error correction means comprises a trellis decoder.

7. A signal transmission and reception apparatus according to claim 1, further comprising a band path filtering means for filtering the n-level VSB modulation signal before being transmitted.

8. A signal transmission [and reception] apparatus for transmitting an n-level VSB signal, comprising:

a compression means for compressing an input video signal into a digital video compression signal;

an error correction encoding means for adding an error correction code to the digital video compression signal to produce an error correction coded signal;

a modulation means for modulating the error correction coded signal to an n-level VSB modulation signal, said modulation means comprising a means for allocating code points along a uniaxial modulation coordinate system, and a filter means having a plurality of coefficients which are a series of impulse responses defined by plotting timebase responses to the VSB modulation signal along the in-phase axis and its orthogonal axis for filtering a series of said code points allocated along the uniaxial modulation coordinate system; and

a transmission means for transmitting the modulation signal.

9. A signal transmission apparatus according to claim 8, further comprising a band path filtering means for filtering the n-level VSB modulation signal before being transmitted.

10. A signal receiving apparatus comprising:

a tuner for receiving a transmission signal containing a digital modulation signal and an analog modulation signal and for selecting the digital modulation signal using a local oscillation signal;

an interference detecting means for detecting interference caused by the analog modulation signal from the digital modulation signal selected by the tuner;

a notch filter means responsive to the interference detected by the interference detecting means for removing a carrier of the analog modulation signal in a same frequency band as a frequency band of the digital modulation signal;

an error ratio calculating means for calculating a bit error ratio of an output of the notch filter means; and

an automatic frequency correcting means for changing a frequency of the local oscillation signal of the tuner according to a level of the interference detected by the interference detecting means and the bit error ratio calculated by the error ratio calculating means to compensate for a frequency offset of the carrier of the analog modulated signal.

11. A signal receiving apparatus according to claim 10, wherein the digital modulation signal is an n-level VSB modulation signal.

12. A signal receiving apparatus comprising:

a tuner for receiving a transmission signal containing at least one of a VSB modulated signal and a QAM modulated signal and for selecting one of the VSB modulated signal and the QAM modulated signal to obtain a selected signal;

an analog-to-digital converter for converting the selected signal into a series of digital codes;

a transversal filter provided on an orthogonal axis for suppressing a transmission distortion of the series of digital codes with respect to both orthogonal axes to obtain a series of filtered digital codes allocated on the orthogonal axes;

a carrier recovery means for phase-compensating a carrier of the filtered digital codes allocated on the orthogonal axis outputted from the transversal filter; and

a control means for producing a control signal to extract detected codes at equal time intervals from the VSB modulated signal;

a clock reproducing means for phase synchronizing entire codes of the QAM modulated signal when the selected signal is the QAM modulated signal and for phase synchronizing codes of the VSB modulated signal intermittently at predetermined intervals when the selected signal is the VSB modulated signal; and

a decoding means for decoding an output of the carrier recovery means.

* * * * *

13. A signal transmission apparatus comprising:

a modulator for modulating a carrier wave with an input signal to produce a modulated signal having symbols each representing a corresponding one of m signal points in a signal space diagram, where m is an integer, said modulator including means for receiving the input signal containing a first data stream of n values where n is an integer and a second data stream, dividing the m signal points into n signal point groups, assigning n values of the first data stream to the n signal point groups respectively, and assigning data of the second data stream to the signal points of each of the n signal point groups; and

a transmitter for transmitting the modulated signal,

wherein said modulator includes shifting means for shifting the signal points of the received signal to other positions in the signal space diagram so that a distance between any closest two signal points of any adjacent two signal point groups becomes $2\delta \times S$ whereby the m signal points are distinguishable from one another in the signal

space diagram by a first set of thresholds which divides the signal space diagram into m regions and the n signal point groups are distinguishable from one another in the signal space diagram by a second set of thresholds which divides the signal space diagram more coarsely than the first set of thresholds into n regions, where 2δ is a distance between the closest two signal points of the adjacent two signal point groups when the m signal points are allocated in the signal space diagram at equal intervals, and S is a shift coefficient which is more than 1.

14. A signal transmission apparatus according to claim 13, wherein each of the first and second data stream carries information constituting a television image.

15. A signal receiving apparatus for reconstructing a received signal having symbols each representing a corresponding one of P signal points in a signal space diagram where P is an integer, the P signal points being divided into n signal point groups where n is an integer, each containing P/n signal points, the received signal containing a first

data stream which is assigned to the n signal point groups, and a second data stream which is assigned to the P/n signal points of each of the n signal point groups, said apparatus comprising:

a demodulator for demodulating a received signal to obtain reconstructed data, the demodulator including means for distinguishing the n signal point groups from one another by a second set of thresholds, and for demodulating values of the distinguished n signal point groups to obtain reconstructed data of the first data stream, and means for distinguishing the P/n signal points in each of the n signal point groups by a first set of thresholds, and for demodulating values of the distinguished P/n signal points in each of the n signal point groups to obtain reconstructed data of the second data stream; and

an output circuit for outputting at least one of the reconstructed data of the first and second data streams from the demodulator,

wherein the signal points of the received signal have been shifted to other positions in the signal space diagram so that a distance between any closest two signal points of any adjacent two signal point groups becomes 2δ x

S whereby the P/n signal points in each of the n signal point groups are distinguishable from one another in the signal space diagram by the first set of thresholds and the n signal point groups are distinguishable from one another in the signal space diagram by the second set of thresholds, where 2δ is a distance between the closest two signal points of the adjacent two signal point groups when the P signal points are allocated in the signal space diagram at equal intervals, and S is a shift coefficient which is more than 1, and

wherein the demodulator includes means for cancelling the second data stream when the error rate of data transmission becomes higher than a predetermined rate while continuing outputting the first data stream to thereby provide only information carried by the first data stream.

16. A signal receiving apparatus according to claim 15, wherein each of the first and second data stream carries information constituting a television image.

17. A signal transmission apparatus comprising:

a modulator for modulating a carrier wave with an input signal to produce a modulated signal having symbols each representing a corresponding one of m signal points in a signal space diagram, where m is an integer, said modulator including means for receiving the input signal containing a first data stream of n values where n is an integer and a second data stream, dividing the m signal points into n signal point groups, assigning n values of the first data stream to the n signal point groups respectively, and assigning data of the second data stream to the signal points of each of the n signal point groups; and

a transmitter for transmitting the modulated signal,

wherein said modulator includes shifting means for shifting the signal points of the received signal to other positions in the signal space diagram so that a distance between any closest two signal points of any adjacent two signal point groups becomes $2\delta \times S$ whereby the m signal points are distinguishable from one another in the signal space diagram by a first set of thresholds which divides the signal space diagram into m

regions and the n signal point groups are distinguishable from one another in the signal space diagram by a second set of thresholds which divides the signal space diagram more coarsely than the first set of thresholds into n regions, where 2δ is a distance between the closest two signal points of the adjacent two signal point groups when the m signal points are allocated in the signal space diagram at equal intervals, and S is a shift coefficient which is more than 1,

wherein said apparatus further comprises means for producing signal point allocation distinguishing information including the value of m and information necessary for determining the first and second sets of thresholds, and

wherein said transmitter transmits said signal point allocation distinguishing information together with the modulated signal.

18. A signal transmission apparatus according to claim 17, wherein each of the first and second data stream carries information constituting a television image.

19. A signal receiving apparatus for

reconstructing a received signal having symbols each representing a corresponding one of P signal points in a signal space diagram where P is an integer, the P signal points being divided into n signal point groups where n is an integer, each containing P/n signal points, the received signal containing a first data stream which is assigned to the n signal point groups, and a second data stream which is assigned to the P/n signal points of each of the n signal point groups, said apparatus comprising:

a demodulator for demodulating a received signal to obtain reconstructed data, the demodulator including means for distinguishing the n signal point groups from one another by a second set of thresholds, and for demodulating values of the distinguished n signal point groups to obtain reconstructed data of the first data stream, and means for distinguishing the P/n signal points in each of the n signal point groups by a first set of thresholds, and for demodulating values of the distinguished P/n signal points in each of the n signal point groups to obtain reconstructed data of the second data stream; and

an output circuit for outputting at least

one of the reconstructed data of the first and second data streams from the demodulator,

wherein the signal points of the received signal have been shifted to other positions in the signal space diagram so that a distance between any closest two signal points of any adjacent two signal point groups becomes $2\delta \times S$ whereby the P/n signal points in each of the n signal point groups are distinguishable from one another in the signal space diagram by the first set of thresholds and the n signal point groups are distinguishable from one another in the signal space diagram by the second set of thresholds, where 2δ is a distance between the closest two signal points of the adjacent two signal point groups when the P signal points are allocated in the signal space diagram at equal intervals, and S is a shift coefficient which is more than 1,

wherein the received signal includes therein signal point allocation distinguishing information including the value of P and information necessary for determining the first and second sets of thresholds, and

wherein the demodulator extracts the signal point allocation distinguishing information from the received signal, and

demodulates the received signal by setting at least one of the first and second sets of thresholds based on the extracted signal point allocation distinguishing information.

20. A signal receiving apparatus according to claim 19, wherein each of the first and second data stream carries information constituting a television image.

add A3)

Add B1)

Add B1)